BROOKS, PIERCE, MCLENDON, HUMPHREY & LEONARD, L.L.P.
ATTORNEYS AT LAW
RALEIGH, NORTH CAROLINA

MAILING ADDRESS
POST OFFICE BOX 1800
RALEIGH, N.C. 27602

OFFICE ADDRESS
SUITE 1600
FIRST UNION CAPITOL CENTER
150 FAYETTEVILLE STREET MALL
RALEIGH, N.C. 27601

TELEPHONE 919-839-0300
FACSIMILE 919-839-0304

L.P. McLENDON, JR.
HUBERT HUMPHREY
EDGAR B. FISHER, JR.
W. ERWIN FULLER, JR.
JAMES T. WILLIAMS, JR.
WADE H. HARGROVE
M. DANIEL McGINN
MICHAEL D. MEEKER
WILLIAM G. McNAIRY
EDWARD C. WINSLOW III
HOWARD L. WILLIAMS
GEORGE W. HOUSE
WILLIAM P.H. CARY
REID L. PHILLIPS
ROBERT A. SINGER
JOHN H. SMALL
RANDALL A. UNDERWOOD
S. LEIGH RODENBOUGH IV
WILLIAM G. ROSS, JR.
MARK J. PRAK
JILL R. WILSON
MARC D. BISHOP
JIM W. PHILLIPS, JR.
MACK SPERLING
JEFFREY E. OLEYNIK
MARK DAVIDSON
JAMES R. SAINTSING
JOHN W. ORMAND III
ROBERT J. KING III

STEVEN J. LEVITAS
V. RANDALL TINSLEY
JOHN R. ARCHAMBAULT
S. KYLE WOOSLEY
DANIEL M. SROKA
FORREST W. CAMPBELL, JR.
MARCUS W. TRATHEN
JEAN C. BROOKS
ELLEN P. HAMRICK
JAMES C. ADAMS, II
ALLISON M. GRIMM
ELIZABETH S. BREWINGTON
JOHN K. EASON
H. ARTHUR BOLICK II
NATASHA RATH MARCUS
JOHN M. CROSS, JR.
JENNIFER K. VAN ZANT
KEARNS DAVIS
DAVID W. SAR
KATHLEEN M. THORNTON
BRIAN J. McMILLAN
JENNIFER L. BOLICK
DAVID KUSHNER
DEREK J. ALLEN
ELIZABETH V. LAFOLLETTE
GINGER S. SHIELDS
HAROLD H. CHEN
COE W. RAMSEY

FOUNDED 1897

AUBREY L. BROOKS (1872-1958)
W.H. HOLDERNESS (1904-1965)
L.P. McLENDON (1890-1968)
KENNETH M. BRIM (1898-1974)
C.T. LEONARD, JR. (1929-1983)
CLAUDE C. PIERCE (1913-1988)
THORNTON H. BROOKS (1912-1988)
G. NEIL DANIELS (1911-1997)

GREENSBORO OFFICE
2000 RENAISSANCE PLAZA
230 NORTH ELM STREET
GREENSBORO, N.C. 27401

WASHINGTON OFFICE
2000 L STREET N.W., SUITE 200
WASHINGTON, D.C. 20036

January 15, 1999

Ms. Magalie R. Salas
Secretary
Federal Communications Commission
445 12th Street, S.W., TWA325
Washington, D.C. 20554

Re: Motion For Leave To File Supplemental Information And Supplemental Information - CS Docket No. 98-201

Dear Ms. Salas:

Transmitted herewith on behalf of the ABC Television Affiliates Association, the CBS Television Network Affiliates Association, the Fox Television Affiliates Association, and the NBC Television Affiliates Association (collectively, the "Affiliate Associations") are an original and eleven (11) copies of a Motion For Leave To File Supplemental Information and an original and eleven (11) copies of the Supplemental Information for filing in the above-captioned proceeding.

If any questions should arise during the course of your consideration of this matter, it is respectfully requested that you communicate with this office.

Sincerely,

Wade H. Hargrove

Enclosures

No. of Copies rec'd 045
List ABCDE

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Satellite Delivery of Network Signals to	)	CS Docket No. 98-201
Unserved Households for Purposes of the	)	RM No. 9335
Satellite Home Viewer Act	)	RM No. 9345
	)	
Part 73 Definition and Measurement of	)	
Signals of Grade B Intensity	)	

To: The Commission

MOTION FOR LEAVE TO FILE SUPPLEMENTAL INFORMATION

The ABC Television Affiliates Association, the CBS Television Network Affiliates Association, the Fox Television Affiliates Association, and the NBC Television Affiliates Association (collectively, the "Affiliate Associations"), by their attorneys, hereby move for leave to file the attached "Supplemental Information" in the above-captioned proceeding. The filing provides the Commission with additional information on the Longley-Rice propagation model and is provided in response to presentations to the Commission by other parties.

Respectfully submitted,

By _____

Wade H. Hargrove
Kathleen M. Thornton
David Kushner
BROOKS, PIERCE, McLENDON,
HUMPHREY & LEONARD, L.L.P.
First Union Capitol Center
Suite 1600 (27601)
Post Office Box 1800
Raleigh, North Carolina 27602
Telephone: (919) 839-0300
Counsel for the ABC Television Affiliates Association and the Fox Television Affiliates Association

By _____

Kurt A. Wimmer
Erin M. Egan
COVINGTON & BURLING
1201 Pennsylvania Avenue, N.W. (20004)
Post Office Box 7566
Washington, D.C. 20044-7566
Telephone: (202) 662-6000
Counsel for the CBS Television Network Affiliates Association

By _____

Antoinette Cook Bush
David H. Pawlik
SKADDEN ARPS SLATE
MEAGHER & FLOM
1440 New York Avenue, N.W.
Washington, D.C. 20005-2111
Telephone: (202) 371-7000
Counsel for the NBC Television Affiliates Association

January 15, 1999

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Satellite Delivery of Network Signals to	)	CS Docket No. 98-201
Unserved Households for Purposes of the	)	RM No. 9335
Satellite Home Viewer Act	)	RM No. 9345
	)	
Part 73 Definition and Measurement of	)	
Signals of Grade B Intensity	)	

To: The Commission

SUPPLEMENTAL INFORMATION

Wade H. Hargrove
Kathleen M. Thornton
David Kushner
BROOKS, PIERCE, McLENDON,
HUMPHREY & LEONARD, L.L.P.
First Union Capitol Center
Suite 1600 (27601)
Post Office Box 1800
Raleigh, North Carolina 27602
Telephone: (919) 839-0300
Facsimile: (919) 839-0304
Counsel for the ABC Television Affiliates Association and for the Fox Television Affiliates Association

Kurt A. Wimmer
Erin M. Egan
COVINGTON & BURLING
1201 Pennsylvania Avenue, N.W. (20004)
Post Office Box 7566
Washington, D.C. 20044-7566
Telephone: (202) 662-6000
Facsimile: (202) 662-6291
Counsel for the CBS Television Network Affiliates Association

Antoinette Cook Bush
David H. Pawlik
SKADDEN ARPS SLATE MEAGHER & FLOM
1440 New York Avenue, N.W.
Washington, D.C. 20005-2111
Telephone: (202) 371-7000
Facsimile: (202) 393-5760
Counsel for the NBC Television Affiliates Association

January 15, 1999

Table of Contents

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Satellite Delivery of Network Signals to	)	CS Docket No. 98-201
Unserved Households for Purposes of the	)	RM No. 9335
Satellite Home Viewer Act	)	RM No. 9345
	)	
Part 73 Definition and Measurement of	)	
Signals of Grade B Intensity	)	

To: The Commission

SUPPLEMENTAL INFORMATION

The ABC Television Affiliates Association, the CBS Television Network Affiliates Association, the Fox Television Affiliates Association, and the NBC Television Affiliates Association (collectively, the "Affiliate Associations"), by their attorneys, hereby provide the following supplemental information to the Commission concerning the Longley-Rice propagation model.

I. Buildings, Vegetation, And Interference

Although the Commission's Grade B planning factors have never *expressly* incorporated factors for buildings and vegetation, the empirical data upon which they are based did, in fact, account for the buildings and vegetation as they existed at the time the empirical measurements were collected. The FCC's current propagation curves in 47 C.F.R. § 73.699 are derived from a series of empirical measurements taken on mobile surveys. The report developing these curves states that the VHF propagation curves were based on field strength measurements taken on mobile runs of 60

miles, starting 10 miles from the transmitter.[1] The report further provides a list of the more than 100 mobile runs used. Each field strength measurement necessarily takes into account the buildings and vegetation existing at the time of the measurement that are located between the transmitter and the measurement location since there was no way that a 60 mile path could have been cleared for each mobile run. Indeed, the report expressly recognizes that "variations of individual measurements of field strength" will be due not only to overall terrain roughness but also to "obstructions of hills, *trees*, etc., antenna heights, *local structural environment*, inclination of the land, and weather conditions over the propagation path."[2]

Predictive models such as Longley-Rice also already account for factors such as buildings and vegetation inasmuch as they, too, are empirically-based. As the Longley-Rice Manual explains, the model combines certain theoretical treatments

> using empirical relations derived as fits to measured data. This combination of elementary theory with experimental data makes it a *semi-empirical* model . . . .
>
> *The data used in developing the empirical relations have clearly influenced the model itself.* It should then be noted that these data were obtained from measurements made with fairly clear foregrounds at both terminals. In general, ground cover was sparse, but some of the measurements were made in areas with moderate forestation. *The model, therefore, includes effects of foliage, but only to the fixed degree that they were present in the data used.*[3]

Although Longley-Rice is flexible enough to take further account of factors such as buildings and

---

[1] *See* Jack Damelin *et al.*, *Development of VHF and UHF Propagation Curves for TV and FM Broadcasting*, Report No. R-6602 (Office of Chief Engineer Sept. 7, 1966), at 15.

[2] *See id.* at 6 (emphases added).

[3] G.A. Hufford *et al.*, *A Guide to the Use of the ITS Irregular Terrain Model in the Area Prediction Mode*, NTIA Report 82-100 (U.S. Dep't of Commerce Apr. 1982) ["Longley-Rice Manual"], at 12 (emphases added); *see also id.* at 22.

vegetation, to do so would not be advisable. Because of the empirical foundation of Longley-Rice incorporating such factors, it would be difficult—if not impossible—to "back out" the building and vegetation data incorporated into the existing Longley-Rice model and then add in only the new data. But if that original data were not subtracted, and the new building and vegetation data were added, then a significant amount of building and vegetation data would be "double-counted," and the reliability of the model's predictions of field strength would be compromised.[4]

In addition to the error that would be created by "double-counting," these factors should not be taken into *further* account for the following reasons:

Buildings and Clutter. To our knowledge, there is no complete and reliable database in existence for buildings on a national basis. Structures are built and demolished every hour of the day. Land use and land clutter change constantly. It is not possible to newly implement *any* predictive model that could accurately and reliably utilize a buildings/clutter factor on a nationwide basis given the current lack of empirical data.

More important, however—and why the Commission need not concern itself with this factor—is the basic fact that large buildings exist where most of the people are—in cities and towns. Fundamental to television broadcast service is the Commission's requirement that a certain *minimum* field strength, known as city grade, be provided "over the entire principal community to be served."[5] Thus the minimum ambient field strength over each broadcaster's city of license is far in excess of

---

[4] *See* Affiliate Associations Reply Comments, Further Engineering Statement of William R. Meintel [hereinafter "Further Engineering Statement"], at 6-7.

[5] 47 C.F.R. § 73.685(a).

the ambient field strength located at the perimeter of a station's predicted Grade B contour.[6] Yet it is only this latter, significantly lesser, field strength that is relevant to determining the eligibility status of households located in "typically rural" America,[7] where Congress contemplated unserved households would exist for purposes of the compulsory license granted by the Act. Television towers, at heights up to 2000 feet, are the tallest structures in the world, far taller than the buildings concentrated in the cities and towns that might impede radio frequency propagation.

Vegetation. There is no accepted industry practice, to our knowledge, for considering vegetation for purposes of predicting radio frequency propagation. As with buildings, there is no complete, current, and detailed database containing vegetation data on a nationwide basis. The Affiliate Associations understand that the Department of Agriculture may possess a vegetation database but that the data contained in it is "rough," i.e., it is not in sufficient detail to be of use in predicting signal strength at individual households.

There are serious limitations to considering vegetation at all, which, of course, is why there is no accepted industry practice on this matter. Vegetation changes with the seasons and with development. Half the year deciduous trees contain foliage; the other half they do not. One month there is a forest; the next it is pastureland or a new subdivision or shopping center. Attempting to take account of vegetation will only serve to aggravate compliance difficulties.

Empirical data demonstrate that the Longley-Rice model, without further considering buildings or vegetation beyond that built into its empirical foundations, is remarkably accurate in predicting Grade B field strength. In connection with the *CBS v. PrimeTime 24* lawsuit, Jules

---

[6] *See id.* (requiring a *minimum* field strength of 74 dBu for low VHF, 77 dBu for high VHF, and 80 dBu for UHF).

[7] H.R. Rep. No. 100-887, pt.2, at 19 (1988).

Cohen, an eminent broadcasting engineer with decades of experience, supervised signal intensity measurements at more than 500 households. In analyzing the data collected, he determined that Longley-Rice successfully predicted the presence or absence of a signal of Grade B intensity, as verified by actual measurement, at 100% of the locations in Miami, 99% of the locations in Charlotte, 94% of the locations in Baltimore, 73% of the locations in Pittsburgh (chosen to be an extreme worst case), and 99% of the locations in Raleigh-Durham.[8] These field strength tests, conducted at randomly selected, specific subscriber households, confirm the predictive reliability of Longley-Rice.

Interference. Interference is not a matter of signal intensity. The Act refers only to "an over-the-air *signal of grade B intensity*."[9] The Commission has no authority to ignore the language in, or to rewrite, any congressional act—let alone a copyright act.[10]

Moreover, even as a policy matter, it would not make sense to rewrite the Act to take interference into account. Although intuitively one may believe that at locations predicted to receive interference one would not receive an acceptable picture, that is not necessarily the case. In our Reply Comments, we submitted a videotape that shows what television pictures actually look like

---

[8] *See* National Association of Broadcasters Comments, Cohen Engineering Statement, at 14-17.

[9] 17 U.S.C. § 119(d)(10) (emphasis added). In fact, as a technical paper attached to PrimeTime 24's Comments recognizes, "field intensity is vastly the most important factor in picture quality." Neil M. Smith, *Relationship of Television Picture Quality to Field Intensity*, unpublished paper (Mar. 30, 1971), at 14 (attached to Comments of PrimeTime 24 Joint Venture). This is why the Act specifies an objective signal intensity standard, not a subjective picture quality standard.

[10] *See, e.g., Southwestern Bell Corp. v. FCC*, 43 F.3d 1515, 1520 (D.C. Cir. 1995).

at various field strength levels.[11] The recordings were made last year in connection with the copyright infringement case initiated by ABC, Inc. against PrimeTime 24 on behalf of WTVD(TV), Durham, North Carolina, which broadcasts on Channel 11.[12] The Affiliate Associations have had Decisionmark Corp. prepare a signal area map for WTVD, *see* Exhibit (attached hereto), that shows those locations that Longley-Rice predicts will be able to receive a signal of at least Grade B intensity (shown in blue) as well as those locations that, although predicted to receive a signal of Grade B intensity, are also predicted to receive objectionable interference (shown in orange). Decisionmark also geocoded the twelve sites for which recordings are provided on the submitted videotape. Of the twelve sites tested,[13] only one—Site 12, in Snow Camp, North Carolina—is predicted both to receive a signal of at least Grade B intensity and to receive objectionable interference.[14] Examination of the videotape reveals that Site 12, when viewed with a conventional mid-price Yagi antenna purchased from Radio Shack for less than $80, receives a very acceptable and viewable picture with no impairment from interference, let alone from *objectionable* interference.[15] Site 12 is located 57.6 miles from WTVD's transmitter and was measured to receive

---

[11] *See* Affiliate Associations Reply Comments, Exhibit D.

[12] *See id.* at 25.

[13] *See id.*, Exhibit C, Attachments A & B (showing a list of sites tested and providing a map indicating the measurement locations with respect to the FCC predicted Grade B contour). Although the site list appearing in Attachment A does not include addresses, the site addresses were included in the materials submitted to the court in the *ABC* case.

[14] An enlarged map indicating the location of Site 12 is provided in the attached Exhibit. Three of the other sites, Sites 4, 9, and 14, were very near predicted interference areas but were not themselves predicted to receive interference.

[15] In viewing the videotape it should be kept in mind that degradation to some extent results from the recording and playback processes. The extent of this degradation can be seen in the site

(continued...)

a signal strength of 61.5 dBu.

The videotape therefore demonstrates the wisdom of Congress in defining an "unserved" household purely in terms of signal intensity. While it may be important for the Commission to base its table of allotments on predicted interference-limited service areas, the policy factors that were important in that context (especially when those interference limitations are based on a very low threshold level of 10% of the time) are absent in the context of a copyright statute that grants a narrow compulsory license in derogation of the normally exclusive distribution right under copyright law. Were the Commission to recommend that interference be taken into account in predicting Satellite Home Viewer Act eligibility, then it would not only be altering the indisputable will and intent of Congress, but it would also be advocating a prediction methodology that predicts—incorrectly and wrongfully—a lack of service at many locations, such as Site 12, that, in fact, receive a signal of Grade B intensity resulting in a picture of very acceptable quality. The legal effect would be—contrary to the express language of the Act and the decisions of two federal courts interpreting the Act—to shift the burden of proving subscriber eligibility to the local network affiliate and away from the satellite carrier.

II. Error Codes

When a calculation is considered outside certain preset limits on reliability, the Longley-Rice model does not actually predict service but, instead, sets a flag that the prediction may not be reliable. In the DTV implementation of Longley-Rice, these flagged values were ignored and service was assumed at that point. That treatment of the flags was a policy decision, not something built

---

[15](...continued)
identification billboards that immediately precede and follow the actual over-the-air recording.

into, or inherent in, the Longley-Rice model itself.[16]

Further analysis of those flagged Longley-Rice field strength values has shown that, in most instances, the flags were false alarms. In these cases, the flagged values have been found to be in reasonable agreement with other non-flagged, reliable predictions in the immediate area surrounding the point in question.[17]

A predictive model is not a substitute for an actual measurement. Longley-Rice is but an administrative *tool* that can be used within its recognized limitations.

Longley-Rice, when run with standard inputs, is neither over- nor under- predictive. Where outside its preset reliability limits, the model will flag the returned field strength values. Because most of these flags are false alarms, one possibility is to ignore the flags and use the returned field strength values.[18] The better option for purposes of the Act, however, is to make a policy decision similar to the one the Commission made in the DTV implementation of Longley-Rice which is to treat all flagged points as served. In the SHVA context, flagged values should be evaluated with respect to a threshold level *below* Grade B service. Where returned values are flagged that exceed the threshold, the location should be treated as served; flagged values below the threshold would be ignored, indicating the location is unserved. The reason for this policy, and for setting the threshold below current Grade B service levels, is clear: To promote localism and preserve the network/affiliate relationship, a principal goal of the Act, the Commission should take all appropriate action to protect the integrity of the copyrights and copyright licenses acquired in a free market by

---

[16] *See* Further Engineering Statement at 5-6.

[17] *See id.* at 6.

[18] This is the course of action recommended by Hammett & Edison, Inc. *See* Comments of Hammett & Edison, Inc. at 7.

networks and their local affiliates. It is an axiom of statutory construction that compulsory licenses are to be construed narrowly.[19] If the Commission is to err, it should err on the side of protecting copyrights and local, free, over-the-air broadcast service. It should not err by constructing a new predictive model that understates the number of "served" households.

III. TIREM

If the Commission is to recommend to Congress any predictive model, then it should recommend the Longley-Rice model, not TIREM. The Commission, just last year in the DTV proceeding, again examined the debate over the respective merits of Longley-Rice vis-à-vis TIREM and expressly concluded that the Longley-Rice model should be preferred and utilized over TIREM:

> The methodology for calculating service and interference,[20] including the use of the Longley-Rice propagation model and the presumption of service, was developed by our Advisory Committee. We note that this was a public process and that the development of this methodology underwent considerable debate. In their deliberations, the Advisory Committee considered and rejected a number of alternative propagation models, including the TIREM model. While we recognize that the Longley-Rice model may have certain limitations, as do all propagation models, we continue to believe that it provides a sufficiently accurate measure of service and interference. Furthermore, the Longley-Rice model is in the public domain and has been extensively documented, thereby ensuring that all parties using this model will be able to achieve the same results. *We further note that other models, such as TIREM, are proprietary and can yield very different results, depending upon their implementation.* Accordingly, we are reaffirming our decision to use

---

[19] *See, e.g., Fame Publ'g Co. v. Alabama Custom Tape, Inc.*, 507 F.2d 667, 670 (5th Cir.), *cert. denied*, 423 U.S. 841 (1975).

[20] Although interference considerations were appropriate in the DTV context, the Affiliate Associations reiterate that in the SHVA context they are inappropriate because interference is unrelated to signal strength, and, as shown above, locations that receive an acceptable quality picture will be incorrectly predicted to be unserved.

the Longley-Rice model.[21]

Given (1) this reasoning from the Commission just last year; (2) the empirical data discussed above that demonstrate the accuracy and reliability of the Longley-Rice model, version 1.2.2; and (3) the recognition by independent engineers that the Longley-Rice "model is a clear *de facto* standard within the country,"[22] there is no basis in the record of this proceeding (indeed, there is none anywhere) upon which the Commission could rationally adopt, or recommend that Congress adopt, TIREM.

The Affiliate Associations understand that certain parties and their engineers have recommended TIREM to the Commission in ex parte presentations. However, TIREM is available in many versions, the vast majority of which have never been field tested and verified for accuracy. We are advised that the specific version that these parties are recommending is proprietary. It is believed that to properly adapt this proprietary version of TIREM for purposes of the Act would cost more than $500,000. Who will bear this cost? Will the Commission?

It must be further noted that neither the Commission nor the broadcast and satellite industries as a whole have much experience with TIREM, whereas at least the former two have considerable experience with Longley-Rice. It would be a waste of Commission resources and would undermine

---

[21] Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, *Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order*, FCC 98-24, 11 Comm. Reg. (P & F) 634 (1998), ¶ 181 (emphasis added).

[22] Comments of Biby Engineering Services, PC at 3. *See also id.* ("While the merits of any propagation model are subject to dispute, the Longley-Rice model has clear precedent within the FCC. The Longley-Rice model is currently used for the allocation of digital television stations and for some land-mobile applications. The model is a clear *de facto* standard within the country. This engineering firm has used this model for some time and *is very satisfied with the model's performance in the UHF and VHF frequencies, especially in comparison with other models in use.* (emphasis added)).

administrative efficiencies were the Commission to propose TIREM over Longley-Rice in the absence of factual evidence that TIREM is, in fact, more accurate and more reliable.

To the extent the Commission elects to recommend any predictive model, then it should recommend the Longley-Rice model, version 1.2.2, in point-to-point mode with time and confidence inputs of 50%/50%.

IV. Longley-Rice Input Parameters

The Affiliate Associations and other commenters have previously explained why the probabilistic variables in Longley-Rice need to be set at 50% for time and 50% for confidence.[23] For 50 years, the Commission has consistently been concerned with *median* field strength. As the SBCA/Hatfield & Dawson Statement concedes: "The Commission prefers to use calculations that are 'median' (50% values) for *all* of its prediction techniques, probably *because determination of median values of any random data is the most reliable statistical parameter.*"[24]

Location. In point-to-point mode, location variability is not a factor. As Hearst-Argyle explains: "Although in point-to-point mode it is *possible* to vary the location variability factor, there is absolutely no reason to do so since the field strength is being plotted to a specified, known location."[25]

Time. As the Commission is aware, the current Grade B field strength values already incorporate a time fading factor to achieve the desired level of statistical reliability, viz. that the best

---

[23] *See, e.g.*, Affiliate Association Comments at 60-65; Comments of Hearst-Argyle Television, Inc. at 13-14.

[24] SBCA Comments, Hatfield & Dawson Statement, at 3 (emphases added).

[25] Hearst-Argyle Comments at 13 n.28 (emphasis in original).

50% of locations at the contour receive an acceptable picture at least 90% of the time.[26] The Longley-Rice time variability input should only be changed to 90% if the time fading factor is *subtracted* from the median field strength values, i.e., if Longley-Rice were set to predict a field strength of 41 dBu for low VHF, 51 dBu for high VHF, and 60 dBu for UHF.

Confidence. A 50% "confidence" factor is **essential** to ensure that what Longley-Rice predicts is the true Grade B field strength at an individual receive location. Any different value would not result in the prediction of Grade B service at an individual location but the prediction of some different level of service.[27] To appreciate the full significance of the so-called "confidence" factor, the following points are relevant:

1. Even the best predictive models, such as the standard Longley-Rice model, make two types of errors: They either *under*predict the actual signal intensity at certain locations or *over*predict the actual signal intensity at certain locations.

2. One of the inputs needed to run Longley-Rice is the so-called "confidence" factor. The standard input for "confidence" when running Longley-Rice is 50%. As the Office of Engineering and Technology acknowledged, and as run for DTV replication purposes: "The percent confidence is set at 50%, indicating that we are interested in median situations."[28]

3. Running Longley-Rice with a "confidence" input greater than 50% (such as 90%) will necessarily contract the area (or the number of individual locations) predicted to receive a signal of Grade B intensity from a particular transmitter.

---

[26] *See Notice* ¶ 32; *id.* ¶ 4 n.16.

[27] *See* Further Engineering Statement at 7.

[28] *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, OET Bulletin No. 69 (FCC July 2, 1997), at 7.

4. If increasing the "confidence" input meant that Longley-Rice would produce fewer errors *in toto*, then it would always be run with the highest possible "confidence" input. But that is not how the "confidence" factor works.

5. "Confidence," as used in Longley-Rice, is a *term of art* whose meaning is different than the conventional meaning of the word. Running Longley-Rice with a "confidence" input greater than 50% does **not** mean that the results output by Longley-Rice would be "more accurate" in the sense of producing a higher percentage of correct predictions. Rather, increasing the "confidence" input has the effect of decreasing errors of one type and increasing errors of the other type. Shrinking predicted coverage areas by increasing the "confidence" input from 50% to 90% will have two effects: *over*prediction errors will be reduced **and** *under*prediction errors will be increased.

6. This is necessarily the case because increasing the "confidence" factor results in reclassifying some "served" locations as "unserved," while not making any reclassifications in the other direction. In effect, increasing the "confidence" input to a value greater than 50% is simply a backdoor way of increasing the median field strength levels that the Commission has defined as Grade B.

7. If one wanted to decrease the likelihood of *under*prediction, one could adjust the Longley-Rice input in the opposite direction to expand the predicted coverage areas. The 50% "confidence" setting relied on by the FCC in OET Bulletin No. 69 represents a balance between avoiding both overprediction and underprediction. Setting the "confidence" input at a level other than 50% will necessarily skew that balance in favor of either underprediction or overprediction.

8. The Satellite Home Viewer Act places the burden of proof on the satellite carriers to prove that any given household does not receive a signal of Grade B intensity. Two federal courts

have confirmed the plain, unequivocal language to that effect in the Act. Even if a satellite carrier could meet its burden of proof with a predictive model alone—which it could not—a "confidence" factor greater than 50% would be irrelevant in an infringement action brought to enforce the Act because it would not address whether it is "more likely than not" that a particular household is unserved.

9. Increasing the "confidence" factor will shift the site testing burden, and, in turn, the burden of proof, to local stations. The Affiliate Associations respectfully submit that the Commission does not possess the authority to disregard the explicit language of the Act and attempt to rewrite the Act in this manner.

10. The SBCA's engineering experts, Hatfield & Dawson, state in their "Reply" Engineering Statement that "[w]ithin TIREM the percent confidence is set at 50%, indicating that median situations are always predicted—the user has no control over this statistical variable."[29] The fact that the propagation model endorsed by the SBCA will not permit the "confidence" factor to be altered from 50% is further proof that a "confidence" input of 50% in Longley-Rice is the only appropriate level for this factor.

11. As Hatfield & Dawson observe in their initial statement, "[f]or the individual path, specific location, 'unserved household' case," the variability mode for Longley-Rice should be the individual mode.[30] In that mode, reliability is given by time availability, and "confidence" is a combination of location and situation variability.[31] In the typical case in which location variability

---

[29] SBCA Reply Comments, Hatfield & Dawson "Reply" Statement, at 8-9.

[30] SBCA Comments, Hatfield & Dawson Statement, at 10.

[31] *See* Longley-Rice Manual at 71.

and situation variability are *not* combined, the statistical description, referred to as quantiles of quantiles of quantiles, produces a phrase such as "In z % of like situations there will be at least y % of the locations where the field strength will exceed 47 dBu for at least x % of the time."[32] This is why in broadcast area mode the Commission's standard Grade B service requirement for low VHF, for example, must be modeled with input factors of 50%/50%/50% so that "In 50% of like situations there will be at least 50% of the locations where the field strength will equal or exceed 47 dBu for at least 50% of the time."[33] However, as the Longley-Rice Manual explains:

> [F]rom the point of view of an individual receiver [of broadcast service,] [t]hat individual will want to know *only* the probability at that one location of receiving adequate service—that is, of receiving an adequate signal level for an adequate fraction of the time. The distinction between location variability and situation variability will be of no concern and should not enter into our considerations.[34]

Because, in individual mode, "confidence" is expressed as a merged or combined location/situation variability for which there is no distinction between the two, the "confidence" factor must be set at 50% if Longley-Rice is to predict Grade B service. This is the only way Longley-Rice can produce a prediction that duplicates the Commission's standard formulation of Grade B service.[35]

---

[32] *See id.* at 31. Situation variability normally accounts for observed changes in location variability if like-appearing situations are used, i.e., if operations are changed from one area to another very similar area. *See id.* at 30.

[33] As noted above, time variability could be set at 90%, but only if the field strength were lowered to 41 dBu to reflect the elimination of the time fading factor, which already boosts time availability to 90%.

[34] Longley-Rice Manual at 36 (emphasis added).

[35] Again, that standard formulation seeks to provide, at the best 50% of locations along the Grade B contour, that the median observer will receive an acceptable picture at least 90% of the time. *See, e.g., Notice* ¶ 32, ¶ 4 n.16. In Longley-Rice terms, that formulation, for the low VHF band, can be statistically stated—in quantiles of quantiles—in one of two ways: (1) in this situation

(continued...)

V. Engineering Analysis

The accompanying chart and the data and signal area maps provided in the attached Exhibit show the effects of several possible changes in the way Longley-Rice is run.

Data and maps for eight representative television stations are provided. These stations comprise two low VHF, three high VHF, and three UHF stations. Because of the length of time required to process the data when interference is considered, the Affiliate Associations arranged for four stations to be analyzed by William R. Meintel, the engineer the Affiliate Associations have retained throughout this proceeding, and for four stations to be analyzed by Decisionmark Corp., the company that provided the signal area maps the Affiliate Associations submitted in the initial Comments. The accompanying chart aggregates the data for all eight stations.

Mr. Meintel has provided two maps for each of the four stations he has analyzed; Decisionmark has prepared one map for each of the four stations it has analyzed. On all of the maps, all points shown in blue or orange are those locations that Longley-Rice predicts will be able to receive a signal of at least Grade B intensity. The points shown in blue are those locations where the signal is predicted to be unimpeded by interference; the points shown in orange are those locations that, although predicted to receive a signal of Grade B intensity, are also predicted to receive objectionable interference. All maps were run with Longley-Rice in point-to-mode broadcast mode, the standard way in which the FCC ran the program for DTV replication purposes. The first of the two maps prepared by Mr. Meintel and the one map prepared by Decisionmark show those

---

[35](...continued)
there will be 50% of the path locations along the Grade B contour where the field strength equals or exceeds 41 dBu for at least 90% of the time; or (2) in this situation there will be 50% of the path locations along the Grade B contour where the field strength equals or exceeds 47 dBu for at least 50% of the time. *Cf.* Longley-Rice Manual at 30.

locations predicted to receive a signal of at least Grade B intensity when Longley-Rice is run with standard inputs of 50% location/50% time/50% confidence.[36] Interference is also shown; it was determined with the standard inputs of 50%/10%/50%. The second of the two maps prepared by Mr. Meintel shows those locations predicted to receive a signal of at least Grade B intensity when the "confidence" factor is increased to 90%. The inputs for predicting service were therefore 50%/50%/90%; the inputs for predicting interference were 50%/10%/90%. Although Decisionmark did not prepare signal area maps for this scenario, it did run Longley-Rice analyses with the "confidence" factor increased to 90%, just as Mr. Meintel did; the resulting data are provided in the Exhibit and summarized in the accompanying chart, along with all of the other data.

Although not shown on a map, Mr. Meintel has also conducted Longley-Rice analyses in point-to-point *individual* mode for four stations. In individual mode, which is the appropriate mode when looking at an individual receive location, there is no input whatsoever for location. There are, therefore, only two inputs, one for time and the other for "confidence." As explained above, "confidence" in individual mode reflects a combined locational-situational variability. As expected, the results of Longley-Rice run in point-to-point individual mode with inputs of 50% time/50% confidence are identical to the results when the program is run in point-to-point broadcast mode with inputs of 50% location/50% time/50% confidence. The accompanying chart provides the results when Longley-Rice is run in individual mode with inputs of 50% time/90% confidence.[37] Their significance is addressed below.

---

[36] As explained above, in point-to-point mode, location variability is really not a factor. The input of 50% location is, in effect, a default value or placeholder.

[37] It was not possible for Mr. Meintel to take account of interference when he ran Longley-Rice in individual mode.

Engineering Analysis of Representative Television Stations

		1	2	3	4	5	A	B	C	D	E	F	G
	FCC Grade B	Longley-Rice F(50,50,50) B Limited by Terrain	Longley-Rice F(50,50,50) B Limited by Terrain and Interference	Longley-Rice F(50,50,90) B Limited by Terrain	Longley-Rice F(50,50,90) B Limited by Terrain and Interference	Longley-Rice F(50,90) B Limited by Terrain *Individual Mode*	% Difference Column 1/ Column 2	% Difference Column 1/ Column 3	% Difference Column 1/ Column 4	% Difference Column 3/ Column 4	% Difference Column 2/ Column 3	% Difference Column 1/ Column 5	% Difference Column 3/ Column 5
Station													
WLWT													
Population	3138291	3348525	2840176	2705312	2649207	2320719	-15.18%	-19.21%	-20.88%	-2.07%	-4.75%	-30.69%	-14.22%
Area (sq. km)	33866	37696	27379	24699	23405	19034	-27.37%	-34.48%	-37.91%	-5.24%	-9.79%	-49.51%	-22.94%
KCCI													
Population	919319	951386	825420	842624	819159	792714	-13.24%	-11.43%	-13.90%	-2.78%	2.08%	-16.68%	-5.92%
Area (sq. km)	44786	47212	33236	35076	32265	29536	-29.60%	-25.71%	-31.66%	-8.01%	5.54%	-37.44%	-15.79%
WXII													
Population	2671680	2567799	1911023	2000120	1828610	1636077	-25.58%	-22.11%	-28.79%	-8.57%	4.66%	-36.28%	-18.20%
Area (sq. km)	45256	43656	29674	31094	26931	23607	-32.03%	-28.77%	-38.31%	-13.39%	4.79%	-45.92%	-24.08%
KCRA													
Population	8625838	6888837	3503077	5168790	3373968	3942526	-49.15%	-24.97%	-51.02%	-34.72%	47.55%	-42.77%	-23.72%
Area (sq. km)	51196	57170	48928	45628	41697	38113	-14.42%	-20.19%	-27.06%	-8.62%	-6.74%	-33.33%	-16.47%
WFLX													
Population	4382602	4488557	4476922	4298032	4296335		-0.26%	-4.24%	-4.28%	-0.04%	-4.00%		
Area (sq. km)	16339	16603	14266	12020	11332		-14.08%	-27.60%	-31.75%	-5.72%	-15.74%		
WCCB													
Population	2050567	2266091	1517641	1880062	1449955		-33.03%	-17.04%	-36.02%	-22.88%	23.88%		
Area (sq. km)	24191	26954	16656	20503	14941		-38.21%	-23.93%	-44.57%	-27.13%	23.10%		
WXMI													
Population	2078717	2165658	1806111	1865484	1756989		-16.60%	-13.86%	-18.87%	-5.82%	3.29%		
Area (sq. km)	25667	28129	23177	22494	20862		-17.60%	-20.03%	-25.83%	-7.26%	-2.95%		
WTVD													
Population	2327531	2581544	1995441	2111014	1880806		-22.70%	-18.23%	-27.14%	-10.91%	5.79%		
Area (sq. km)	38409	43105	31534	32494	28146		-26.84%	-24.62%	-34.70%	-13.38%	3.04%		
						Average Change							
						Population	-21.97%	-14.11%	-25.11%	-10.97%	9.81%	-31.61%	-15.52%
						Area	-25.02%	-25.67%	-33.98%	-11.09%	0.15%	-41.55%	-19.82%

In the accompanying chart, Column A shows the percentage effect when predicted service is limited by both terrain and interference and Longley-Rice is run with standard inputs (including 50% confidence). Over the eight stations, interference-limited service would have the effect of reducing the "served" population, for purposes of the Act, by nearly 22% and the "served" area by 25%. But, as discussed above, the videotape previously submitted shows that locations predicted to receive interference do not necessarily receive an unacceptable picture. In fact, although a location may be predicted to receive interference, the picture actually received may be very acceptable and viewable with no indication of impairment by interference whatsoever. Taking interference into account for purposes of the Act, then, would have the effect of increasing the number of purportedly "unserved" households by one almost quarter. But because the language of the Act bases eligibility on signal intensity only, the real effect is that broadcasters would be forced to conduct a significant number of actual site tests in order to protect their copyrights and preserve their local markets.

Column B shows the effect on the population and area predicted to be served when the "confidence" factor is increased from the standard 50% to the nonstandard 90%, excluding interference considerations. The effect of this increase to 90% "confidence" is to shrink the area predicted to be served, on average, by nearly 26% and to reduce the population predicted to be served by more than 14%. In other words, the effect of an increase in the "confidence" factor of this order is to shift from a prediction that neither overpredicts nor underpredicts service to a prediction that overpredicts "unserved" status by approximately 14%. Again, the practical effect is to shift the burden of testing to broadcasters.

Column C shows the percentage effect when predicted service is limited by both terrain and interference and Longley-Rice is run with the "confidence" factor increased to 90%. On average,

interference-limited service run at 90% "confidence" would have the effect of reducing the "served" population by fully one quarter (25.1%) and the "served" area by fully one third (34%) from what it would otherwise be if Longley-Rice were run with standard parameters and interference were not considered. Column D shows the effect of adding interference considerations to an already shrunken service area and population reduced by an increased "confidence" factor. The effect of interference considerations run in the 90% "confidence" scenario further reduces the "served" population by 11% and the "served" area by 11% as well. This effect is approximately half that seen in Column A, when interference is considered with the standard Longley-Rice parameters. This effect is expected because most interference occurs at the outer fringes of a station's reach, and, as the fringes are brought closer in with an increased "confidence" factor, interference ought to be predicted to occur at fewer of those closer-in locations.

Columns F and G examine the effects of running Longley-Rice in point-to-point individual mode vis-à-vis point-to-point broadcast mode. These data are derived from calculations performed for only four stations, and interference was excluded. Although not shown in the chart, the results of calculations run in individual mode are identical to the results of calculations run in broadcast mode when, and only when, the Longley-Rice model is run with standard 50% inputs for each variability factor.[38] Column F shows the effect when the mode of operation is changed from broadcast to individual and the "confidence" input is increased to 90%. The effect, on average, is a reduction in population predicted to be served of nearly one third (31.6%) and a reduction in area predicted to be served of more than 41.5%.

Column G demonstrates the effect of merely changing from broadcast mode to individual

[38] Although not summarized in the accompanying chart, the data at issue is provided in the attached Exhibit.

mode when "confidence" is set at 90% and is not permitted to vary. In these circumstances, the population predicted to be served is 15.5% smaller in individual mode, and the area predicted to be served is nearly 20% smaller. Again, it is appropriate to reiterate that when "confidence" is left at the standard input of 50% there is no, i.e., *zero*, difference in the results between individual and broadcast modes. The fact that Column G shows any difference at all, let alone one of this magnitude, is because, in individual mode, as explained above, the "confidence" factor is really expressing something about a combined locational-situational variability. Altering the "confidence" factor in individual mode from any value but 50% will necessarily have a dual, augmenting effect, for, by altering the one input, two intertwined aspects of the probabilistic functions at the core of Longley-Rice will be simultaneously affected. This artifact further proves how **essential** it is that the "confidence" factor be set at 50% under all circumstances—and particularly if Longley-Rice is run in individual mode. Any other value will result in changing the locational probability, and, therefore, what is being predicted is a level of service that is fundamentally different from Grade B service. In fact, increasing the "confidence" level to 90% in individual mode can actually result in predicted service areas and populations smaller than their respective values for predicted Grade A service when Longley-Rice is run in broadcast mode with standard inputs, as illustrated by the case of WXII(TV), Winston-Salem, North Carolina.

Conclusion

To the extent the Commission wishes to recommend a predictive model to Congress, then the Commission should recommend Longley-Rice, version 1.2.2, in point-to-point mode with inputs of 50% for time and 50% for confidence. The model should not be altered to take further account of buildings or vegetation. Error codes should be treated in a manner similar to the Commission's

treatment of error codes in the DTV proceeding: A threshold should be set below Grade B service, and flagged locations returning a value exceeding that threshold should be treated as served. Interference should not be taken into account because (1) interference is unrelated to signal intensity, the touchstone of the Act, and (2) as demonstrated by a videotape recording, locations predicted to receive interference may, in fact, suffer no degradation in picture quality. It is *essential* that the so-called "confidence" factor be set at the standard 50%. Any greater value will result in a significant decrease in households predicted to be served, without any increase in accuracy. In fact, if Longley-Rice is run with any increases to its standard 50% inputs, with interference taken into account, with alterations that attempt improperly to take account of vegetation and buildings, or with error codes that are ignored or interpreted as "unserved," then the practical result will be to *overstate* significantly the true predicted number of "unserved" households and to shift the burden of testing—which is tantamount to shifting the burden of proof—to broadcasters and away from the satellite carriers upon which Congress placed the burden of proof in the Act itself.

Longley-Rice, when run without artificially high inputs and without extraneous considerations, performs well in predicting those locations at which a signal of least Grade B intensity is received. Empirical evidence demonstrates Longley-Rice's accuracy when run with its standard inputs in the usual way. The model, with standard inputs, is neither over- nor under-predictive of signal intensity. The standard model produces fair and accurate results that do not favor either the broadcasters or the satellite carriers. The Commission should expect nothing more—and nothing less—from any predictive model it would recommend.

Respectfully submitted,

By _____

Wade H. Hargrove
Kathleen M. Thornton
David Kushner
BROOKS, PIERCE, McLENDON,
HUMPHREY & LEONARD, L.L.P.
First Union Capitol Center
Suite 1600 (27601)
Post Office Box 1800
Raleigh, North Carolina 27602
Telephone: (919) 839-0300
Counsel for the ABC Television Affiliates Association and the Fox Television Affiliates Association

By _____

Kurt A. Wimmer
Erin M. Egan
COVINGTON & BURLING
1201 Pennsylvania Avenue, N.W. (20004)
Post Office Box 7566
Washington, D.C. 20044-7566
Telephone: (202) 662-6000
Counsel for the CBS Television Network Affiliates Association

By Antoinette Cook Bush

Antoinette Cook Bush
David H. Pawlik
SKADDEN ARPS SLATE
MEAGHER & FLOM
1440 New York Avenue, N.W.
Washington, D.C. 20005-2111
Telephone: (202) 371-7000
Counsel for the NBC Television Affiliates Association

January 15, 1999